

## TROUSERS FOR ATHLETE PARTICULARLY FOR CYCLIST AND METHOD OF MAKING THE SAME

### **Background of the Invention**

[0001] The present invention relates to cycling shorts and in particular cycling shorts with a designed to conform the anatomical figure of the cyclist.

[0002] The present invention overcomes the disadvantages of the prior art by providing an article or trousers/shorts for an athlete particularly for cyclist and a method of making the same. The cycling shorts minimize bunching and provide a substantially anatomically conformed padding for a cyclist's gender as is illustrated below with respect to the embodiments or configurations of the invention. Additionally, the cycling shorts can include one or more markings, including, but not limited to manufacturer, brand, size and care information. The markings can be performed without the inclusion of a tag at the waistband that can be a nuisance to the wearer by causing scratchy discomfort to adjacent skin.

[0003] The region of a cyclist's anatomy that is in contact with the saddle (also commonly referred to as a seat) of a bicycle is one of the most important areas of the cyclist anatomy. When the cyclist becomes sore, chafed and or blistered in the portion of the anatomy that is in contact (typically through at least one layer of clothing) with the saddle the painful area(s) interfere with the cyclist performance. Problems can be, to some extent, alleviated by wearing well-designed cycling shorts that address avoiding the problems described herein. The shorts can include padding that helps to avoid problems.

[0004] Short padding is typically available in two types: 1) real chamois; and 2) synthetic padding. Real chamois padding is typically the first choice cyclist because, it is comfortable; however its disadvantages include long drying time and special care including special chamois cream for softening after washing. Synthetic padding is also a favored choice because of ease of care.

[0005] Preferably cycling shorts should be cut with a high waist to help prevent the short falling down the cyclist back, causing bunching of the waistband fabric and also public display of "plumber's crack." They could also include leg grippers at the inside of the bottom edge of each leg. Leg grippers help to prevent the shorts from riding up the cyclist's leg, and bunching at the top of the leg where it bends at the hip. Other modifications include having a number of panels such as six or eight panel shorts. This refers to the number of strips of material the short is made from. The panels are cut to form around the cyclist's bottom and thighs, to help preventing chafing. Generally, the larger the

number of panels the more comfortable and better fit the short, as each panel is less contorted to fit the cyclist's shape.

[0006] Currently, in the practice of cycling it is known to use shorts, made of a material which may be partially elasticized, which cling snugly to the body and are usually worn without underwear. The main problem for the athlete is the fact that during races or training the crotch is subjected to continuous stresses, since such part of the body is continuously in contact with the saddle and thus is subjected to all the shocks produced by the unevenness of the ground and by the vibrations transmitted by the bicycle frame. Accordingly, localized reddening is produced which can degenerate into cuts or blisters which make it difficult if not impossible to practice the sport.

[0007] As a partial solution to these drawbacks, it is known to use shorts inside which a padding constituted by a cloth of suitable thickness and made of textile material is sewn internally at the crotch. However, this solution is not ideal, because although the thickness of the padding can initially offer relief, it has been found that it tends to overheat the crotch and most of all that continuous mutual slippage between the crotch and the padding occurs, also due to sweating, which very soon eliminates the initial benefits. Moreover, it has been found that the crotch rests on the padding, and the padding rests on the saddle, forming compression concentration regions which depend on the stresses applied during sports practice and can even cause the onset of soreness. Another partial solution to these drawbacks, it is also known to provide shorts with which a bottom provided with multiple chambers is associated at the crotch region by sewing, the chambers being arranged laterally to a longitudinal axis of the saddle, being mutually distinct and defining diversified supporting regions for the crotch.

[0008] Although they solve some of the above mentioned drawbacks, both this and the preceding solutions suffer the drawback due to the fact that the padding or bottom are made of substantially rigid or scarcely elastic materials, in a percentage which ranges between approximately 0% and 2%, thus rendering useless any small elastic deformation of the fabric that constitutes the shorts. This fact restricts considerably the freedom of movement of the body; moreover, the greater the padding, the thicker it becomes, further increasing overall rigidity and weight, thus hindering movements even more. Moreover, a "diaper" effect is produced: when the cyclist dismounts from the bicycle and walks normally, he is thus further hindered in his movements by the presence of the padding or bottom.

[0009] A reduction in the padding can provide greater freedom of movement but considerably reduces the ability to protect from impacts and vibration on the saddle. Moreover, the use of paddings or bottoms has been found to be subject, during the practice of cycling, to formation of folds, owing to

the arc-like shape of the crotch, the folds producing additional irritation regions, both longitudinally and transversely to the crotch region. Also, it is noted that the use of paddings in known bottoms affects the entire extension of the product and this again entails an increase in the "diaper" effect. In many cycling shorts, the padding is in fact present along the entire extension of the product; even in the method that uses differentiated thicknesses, the flat padding part is obtained by compressing the padding, which thus also affects the apparently flat portions of the bottom.

[0010] As a competitive sport, a recreational activity, or as a means for daily exercise, the popularity of cycling is dramatically increasing. With this increase in popularity, there is also a heightened concern for cycling safety, and an increased demand for comfortable and effective cycling apparel such as shorts. For example, cycling shorts are provided with padding to absorb the shocks and vibrations transmitted through the saddle of the bicycle. Cycling shorts are also manufactured to wick moisture away from the body, to allow freedom of movement and to reduce chafing.

[0011] Typically, a protecting insert is made from natural or synthetic leather and presents a very specific shape in order to prevent the seams used for fastening the insert to the fabric of the trousers, from disturbing the cyclist in action and causing painful, or at least bothersome abrasion. This type of insert for trousers for cyclists has proven itself useful with respect to the objectives for which it was laid out. It has been found however, that the relatively stiff material from which the inserts are made, in the sense of limited extensibility, still can cause discomfort to the user, as the insert cannot adapt sufficiently to the movements of the cyclist, especially to the leg movements, and thus tends to provoke undesirable stretching in certain zones of the cyclist's skin. This is due to the fact that the material chosen for the insert, i.e., natural or synthetic leather, presents very low elasticity values, usually below 10% and in many cases reaching hardly even a few per cent of elasticity. Repeated stretching of skin zones, which are very susceptible by nature in any event, such as the groin zones, can eventually cause local reddening and inflammation of the skin, which are very annoying for the cyclist.

[0012] Some cycling shorts are cut only to fit the male anatomy and the design is used on the female sized shorts. Male and female cycling shorts should be suited to accommodate the posterior and genitals of the individual's anatomy. Females should have available to them shorts that are made to fit their anatomies.

[0013] Prior art cycling shorts generally have a four, six or eight panel construction, elastic ribbing around the bottom of the leg openings and the waist, and additional padding disposed in the buttocks and crotch regions termed a "chamois." The chamois is formed from various layers and materials

which are stitched or laminated together to provide maximum protection to the cyclist. For example, some cycling shorts have a chamois liner including layers of Ultrasuede™, polyurethane foam, and a polyurethane outer layer. Ultrasuede™ is a synthetic suede material manufactured by Dupont of Wilmington, Del. Other cycling shorts have a two-ply chamois and include layers of polyurethane foam, terry cloth, or fleece. Other cycling shorts feature an eight panel shorts construction and a three-ply chamois which has a zigzag baseball stitching design. The chamois in both the in the aforementioned cycling shorts is cut to fit between the legs of the cyclist. However, the stiffness of the multi-ply construction is not conducive to providing a comfortable anatomically conforming fit.

[0014] To overcome this disadvantage, some cycling shorts have a heat formed chamois made from a laminate of Ultrasuede™ and a knitted polyester fleece which are bonded together by an adhesive. The laminate is first heated to a temperature between the softening point and the melting point. While the laminate is at this elevated temperature, it is molded between shaped dies which correspond to the desired anatomical shape. When cooled, the molded chamois is cut from the fabric piece and sewn into the cycling shorts. Thus, an anatomical conforming chamois is achieved for the one position for which the chamois is molded. When the cyclist moves to other positions, however, the excess material still presents a problem and a less than conforming fit is obtained. The heat molding process utilized to obtain the shaped chamois also requires additional expense, labor and time for manufacturing. Therefore, a seat pad is still needed which can be economically made to provide an anatomically conforming fit for the various positions of the cyclist.

[0015] While these improvements are helpful, cycling shorts with padding and, in particular, gender appropriate padding are better for helping the cyclist avoid for example, painful anatomical problems such as the ones previously noted.

### **Summary of the Invention**

[0016] As noted in the aforementioned cycling shorts do not provide gender specific padding nor do they provide a separately made chamois. This invention overcomes the disadvantages of the prior art by providing anatomically correct cycling shorts, breathable cycling shorts.

[0017] An embodiment of the present invention comprises cycling shorts comprising a layered chamois. The bicycle short for a cyclist, can comprise a nylon LYCRA® fabric blend short; and a chamois sewn onto the crotch of the bicycle short wherein the chamois comprises: a top layer suitable for accepting graphics and providing breathability; a cushion layer for providing comfort for a cyclist; and a bottom layer for providing a mate to the top layer so as to enclose the second layer. While

Lycra is a preferred material for elasticized blend fabrics used in making the chamois and shorts of the present invention, other elasticized fabric blends may be used. The use of the term LYCRA® in describing aspects of the present invention should not be construed as limiting the invention but rather is used as an exemplary material in the context of the descriptions. The chamois top layer is comprised of a nylon Lycra blend suitable for accepting ink sublimated graphics. The bicycle shorts are also configured in separate embodiments to comfort the male or female anatomy. An advantage of the present invention is that comfort is provided to the cyclist. The shorts provide breathability and retain the identification of the manufacturer.

[0018] Other advantages of the invention will in part be obvious and will in part be apparent from the specification. The aforementioned advantages are illustrative of the advantages of the present invention.

### **Description of the Drawings**

[0019] In describing the present invention, features of the invention are not necessarily shown to scale. Also, reference will be made herein to **Figures 1-7** of the drawings in which like numerals refer to like features of the invention and in which:

[0020] **Figure 1a** is a front perspective view of prior art cycling shorts of the present invention illustrating typical size/care instructions, brand tag at the waistband;

[0021] **Figure 1b** is front perspective view of the cycling shorts of the present showing the interior chamois stitched to the cycling shorts and an exploded view of an exemplary identification mark such as, for example, a trademark. The cycling shorts are shown by example with translucency for illustration purposes;

[0022] **Figure 1c** is a front perspective view of the cycling shorts of the present showing the interior chamois in the cycling shorts and an including an exemplary identification mark such as, for example, a trademark and related trade dress. The cycling shorts are shown by example with translucency for illustration purposes;

[0023] **Figure 2a** is a top plan view of the cycling shorts of **Figure 1c** an exemplary identification mark such as, for example, a trademark and related trade dress;

[0024] **Figure 2b** is a perspective view of a portion of the cycling shorts of **Figure 1c** illustrating

an exemplary identification mark such as, for example, a trademark and related trade dress;

[0025] **Figures 3a-d** are top plan views of the components of an embodiment of the chamois of the present invention, configured to accommodate a male cyclist's anatomy. For exemplary identification purposes, this embodiment is called an XY™ embodiment or configuration;

[0026] **Figures 4a-d** are top plan views of the components of another embodiment of the chamois of the present invention, configured to accommodate a female cyclist's anatomy. For exemplary identification purposes, this embodiment is called an XX™ embodiment or configuration;

[0027] **Figure 5** is an exploded view of the various components of the chamois of Figure 3d which is illustrative of the XY™ configuration;

[0028] **Figure 6** is a perspective view of an embodiment of the chamois of the present invention illustrating an aspect of the stretch-ability or sheer effect of the chamois in the direction of arrows A and B; and

[0029] **Figure 7** is a cross sectional side view of the chamois' of Figures 2a and 2b illustrating the layered material of the chamois'.

### **Detailed Description of the Present Invention**

[0030] The present invention overcomes the disadvantages of the prior art by providing trousers for athlete particularly for cyclist and method of making same. Note that trousers may also be referred to herein as cycling shorts or shorts and saddle may also be referred to herein as seat or bicycle seat.

[0031] **Figure 1a** is a front perspective view of prior art cycling shorts of the present invention illustrating typical tag at the waistband. The tag information can include but is not limited to size indication (i.e. medium, large, 34" waist, etc.), care instructions (i.e. machine wash, line dry), brand or source of goods (i.e. 2WICE-BRADFORD HOGAN® company). As described above, the tag can irritate adjacent skin of the cyclist. This can lead to the cyclist tearing the tag out and therefore separating the sizing, care instructions, branding or other important information from the shorts (also referred to herein as garment). Both the manufacturer and the consumer have interest in maintaining the tag type information within the garment. Manufacturers of course are interested in the goodwill associated with their tradename or trademark and the identity of the source of the goods so as to

generate association with the manufacturer and also advertise the manufacturer. Consumers have an interest in retaining the tag so that the size, care instructions and other information of interest including the manufacturer can be referenced. This information is helpful if or when a subsequent purchase of a like item is planned by the consumer. Additionally, the removal of a tag from a garment is often done haphazardly by pulling or tearing the tag off the item. This can cause damage to the garment at the seam into which the tag was sewn or a hole in the fabric onto which the tag was adhered.

[0032] **Figure 1b** is a front perspective view of the cycling shorts 30 of the present showing the interior chamois stitched to the cycling shorts and an exploded view of an exemplary identification mark such as, for example, a trademark 32 or other marking. The exemplary trademark 32 YFACTOR™ (a trademark of 2WICE-BRADFORD HOGAN® of Fishkill, New York) is shown in an adjacent exploded view noted by arrow A. The cycling shorts 30 of the XY™ configuration are shown by example with translucency for illustration purposes so that the exemplary position of the chamois 35 can be shown. Positioning of the chamois in the actual article is generally in the interior crotch region 34a of the shorts 34 shown in **Figure 1b**; however, **Figure 1b** is not meant to show a precise position. One of ordinary skill in the art would be able to position the chamois 34 in the shorts 30 in an appropriate position in accordance with the advantages of the present invention. **Figure 1b** also illustrates the stitching of the chamois 34 into the crotch region 34a of the shorts 30. The stitching 36 allows the chamois 34 to stay in position and minimizes movement of the chamois 34 as the fabric that it is stitched to is moved. Also, with the chamois 34 being stitched in, it can be pre-fabricated separately from the shorts 30, an advantage which will be described below but includes easier manufacturing, cost efficiency and the ability to provide graphics on the chamois. Note that the chamois 34 may also be referred to using terms including but not limited to pad, cushion or pillow.

[0033] **Figure 1c** is a front perspective view of the cycling shorts 30 of the present showing the interior chamois in the cycling shorts and an including an exemplary identification mark such as, for example, a trademark, YFACTOR™ (a trademark of 2WICE-BRADFORD HOGAN® of Fishkill, New York) and related trade dress. The cycling shorts 30 of the XY™ configuration (as explained in the description of **Figures 3a-d** below) are shown by example with translucency for illustration purposes so that the exemplary position of the chamois 35 can be shown. Positioning of the chamois in the actual article is generally in the interior crotch region 34a of the shorts 34 shown in **Figure 1c**; however, **Figure 1c** is not meant to show a precise position. One of ordinary skill in the art would be able to position the chamois 34 in the shorts 30 in an appropriate position in accordance with the advantages of the present invention. **Figure 1c** also illustrates the trade dress of the manufacturer on the chamois 34 of the shorts 30.

[0034] **Figure 2a** is a top plan view of the cycling shorts 30 of **Figure 1c** an exemplary identification mark such as, for example, a trademark YFACTOR™ (a trademark of 2WICE-BRADFORD HOGAN® of Fishkill, New York) and related trade dress such as a Y pattern and adjacent striping. **Figure 2b** is a perspective view of a portion of the cycling shorts of **Figure 1c** illustrating an exemplary identification mark such as, for example, a trademark YFACTOR™ (a trademark of 2WICE-BRADFORD HOGAN® of Fishkill, New York) and related trade dress such as the Y pattern and adjacent striping.

[0035] **Figures 3a-d** are top plan views of the components of an embodiment of the chamois 34 of the present invention, configured to accommodate a male cyclist's anatomy. The XY™ configuration chamois 34 (shown assembled in **Figure 3d**) comprises three layers: a first or top cover layer 40 (shown in **Figure 3a**), a second or cushion layer 42 (shown in **Figure 3b**) and a third or bottom cover layer 44 (shown in **Figure 3c**). The components, when assembled comprise the XY™ configuration chamois 34.

[0036] The male's cycling shorts 30 are referred to as the XY™ configuration. The XY™ configuration provides support and secures in place the male genitalia, especially the penis and testicles. The forward section 34b of the chamois is curved to conform to and secure the external male genitalia. Additionally the chamois provides padding for the public bone and the buttocks (at the rear section 34c of the chamois) of the cyclist. The security and support help to minimize movement and chaffing of the genital area.

[0037] **Figures 4a-d** are top plan views of the components of another embodiment of the chamois of the present invention, configured to accommodate a female cyclist's anatomy. The XX™ configuration chamois 34' (shown assembled in **Figure 4d**) comprises three layers: a first or top cover layer 40 (shown in **Figure 4a**), a second or cushion layer 42 (shown in **Figure 4b**) and a third or bottom cover layer 45 (shown in **Figure 4c**). The components, when assembled comprise the XX™ configuration chamois 34'.

[0038] The female's cycling shorts 30 are referred to as the XX™ configuration. The XX™ configuration provides support for and secures in place portions of the external female genitalia, especially portions of the vulva and labia that are adjacent the chamois middle section 34d (when the shorts 30 are worn by the female cyclist). The forward section 34b of the chamois is curved to not provide a secure support at a forward portion 34b of the XX™ configured chamois and hence avoid chaffing of the clitoral area or forward area of the external female genitalia. Additionally the chamois



provides padding for the public bone and the buttocks (at the rear section 34c of the chamois) of the cyclist. The security and support help to minimize movement and chaffing of the middle portion of the genital area. At the forward section, support is avoided so that the chamois avoids bunching around the clitoral area of the female genitalia because bunching and rubbing can cause irritation and chaffing especially when the cyclist is performing a peddling motion.

[0039] The embodiments of the chamois' 34, 34' of the present invention are constructed of layers as for Figures 3a-d and 4a-d. It should be noted that specific construction details are important aspects of the invention. In particular, the method in which the layers of the chamois 34, 34' are sewn together is important. The padded layer 42 is not sewn or adhered to the top layer 40 or bottom layer 44, 46 of the chamois 34, 34', respectively (bottom layer 44 of the XY<sup>TM</sup> chamois 34 or bottom layer XX<sup>TM</sup> chamois 34'). Rather, the top and bottom layers in either embodiment are sewn together and surround or envelop the padded layer so that the padded layer moves to the extent possible, independently from the chamois and within the envelope formed by the chamois 34, 34' top 40 and bottom layers 44, 46. The chamois 34 is attached to the bicycle shorts 30 using stitching (illustrated in Figure 1b) that fastens the envelope (top 40 and bottom layers 44, 46) to the shorts 30. Hence, the padded layer 42 is not fastened to the chamois 34, 34' or the bicycle shorts 30. This construction is called the YFACTOR<sup>TM</sup> and helps to eliminate or reduce bunching of the chamois and also cyclists' discomfort that would be caused by the bunching of a chamois. It should be noted that while the top layer is illustrated as one continuous piece of material it can alternately be constructed of several pieces of material affixed together to form the top layer. The advantage to this alternate embodiment is that various fabrics could be used. For example in Figure 2b illustrates a flap area 40a on two sides of the top layer. The flap area 40a could be one fabric and the printed area of the top layer could be another fabric suitable for being printed upon. Various fabrics could be used to provide for example, a desired breathability and or stretchability. It should also be noted that in construction of the top layer 40 after printing, the elasticized fabric could be bonded to a commercially available foam material to provide the top layer with structure and to provide additional padding to the chamois.

[0040] **Figure 5** is an exploded view of the various components of the chamois of **Figure 3d**. The layers or components of the chamois 34 of the cycling shorts 30 of the XY<sup>TM</sup> configuration are also as explained in the description of **Figures 3a-d** above. The XY<sup>TM</sup> configuration chamois 34 comprises three layers which are fastened together (as is suggested by the arrows **B** in **Figure 5**): The first or top cover layer 40 is preferably elasticized polyester such as polyester with LYCRA® (a trademark of E.I. duPont de Nemours and Company), a second or cushion layer 42 can be made of a foam or cushion material that provides adequate padding for the cyclist anatomy. The amount of padding, i.e. the height of the padding layer can be determined by one of ordinary skill in the art by

including factors in the determination including the amount of bunching that a particular thickness might cause or the amount of protection that a particular thickness might supply. A third or bottom cover layer 44 can be made of a polyester or nylon with LYCRA® (a trademark of E.I. duPont de Nemours and Company). The components, when assembled comprise the XY™ configuration chamois 34. The chamois of the present invention provides for ease of assembly of the bicycle shorts because one chamois is being fixed in the shorts whereas in prior art manufacturing, the construction of the shorts with a chamois is done by sewing each component of the prior art chamois into the prior art shorts individually.

[0041] Returning to **Figures 2a and 2b** which illustrate top plan and perspective views of the cycling shorts 30 of **Figure 1c** having exemplary identification marks such as, for example, the trademark YFACTOR™ (a trademark of 2WICE-BRADFORD HOGAN® of Fishkill, New York) and related trade dress such as the Y pattern and adjacent striping, it is important to note that the construction of the chamois and shorts of the present invention is significant. The first or top cover layer is the layer having the trademark and trade dress graphics. The graphics are produced on the top layer which is preferably a polyester LYCRA® (a trademark of E.I. duPont de Nemours and Company) blend but may also be any suitable fabric that can provide appropriate stretchability and can be printed upon without causing degradation, damage or melting of the fabric (as the case would be with the typical nylon/Lycra® blend fabric used in prior art bicycle shorts). The type of printing is important to the wearability of the shorts 30. The chamois top layer 40 is printed upon using ink sublimation graphics. With the ink sublimation graphics process a transfer design is made up of a carrier paper and inks (typically printed with an inkjet printer onto the carrier paper). When heated to a certain temperature and pressed with a significant amount of pressure for a certain amount of time, the transfer inks are passed over to the imprint-able material. Some inks are adhered and embedded to the surface of the material, while others (namely, sublimation) permeate the coating of the material. The temperature, pressure and time used in the transfer can be determined by one of ordinary skill in the art considering factors such as, for example, the type of fabric, the saturation of the design, and the sublimation permeable aspects of the fabric.

[0042] Ink sublimation is the preferred printing technique because the ink is impregnated into the fabric substrate and the fabric remains breathable. Prior art techniques such as screen printing coat the fabric and do not provide breathability. Such breathability is needed in the situation of the present invention where the graphics are presented on the garment in the crotch area where it is important to maintain breathability for the comfort of the wearer.

[0043] **Figure 6** is a perspective view of an embodiment of the chamois of the present invention

illustrating an aspect of the stretchability of the chamois in the direction of arrows A and B. The sheer effect of the chamois which is a separately assembled component of the bicycle shorts 30 is movement in the A-B direction and not necessarily in the direction of the stretch of the bicycle shorts as is the case in the prior art where the chamois is an integrated part of the prior art shorts and therefore moves with the shorts. The sheer effect is due to the padding layer moving independently within the envelope formed by the top and bottom layers of the chamois. The sheer effect is also due to the chamois being adhered or sewn to the shorts via the top and bottom layers of chamois while the padding layer remains independent and floats within the envelope created by the top and bottom layers of the chamois and also remains substantially optimally positioned in the shorts, relative to the cyclist for comfort and performance.

[0044] **Figure 7** is a cross-sectional side view of the chamois' 34 of Figures 2a and 2b illustrating the layered materials 40, 42, 44 of the chamois' 34.

[0045] **Figures 3, 4 and 5** also illustrate the assembly of the chamois. Figure 1b illustrates the positioning of the chamois in the shorts via stitching around the edge of the envelope. Other suitable methods of adhering the chamois to the shorts may be used such as thermal bonding.

[0046] An advantage of the present invention is that comfort is provided to the cyclist. The shorts provide breathability and retain the identification of the manufacturer. The aforementioned advantages are illustrative of the advantages of the present invention. While the present invention has been disclosed and described with reference to a various embodiments thereof, it will be apparent, as noted above that variations and modifications may be made therein. It is, thus, intended in the following claims to cover each variation and modification that falls within the true spirit and scope of the present invention.